

Mr Eric Skowron

# Confronting the Tsunami – A New Approach to Renewal Planning

ProjectMax Limited

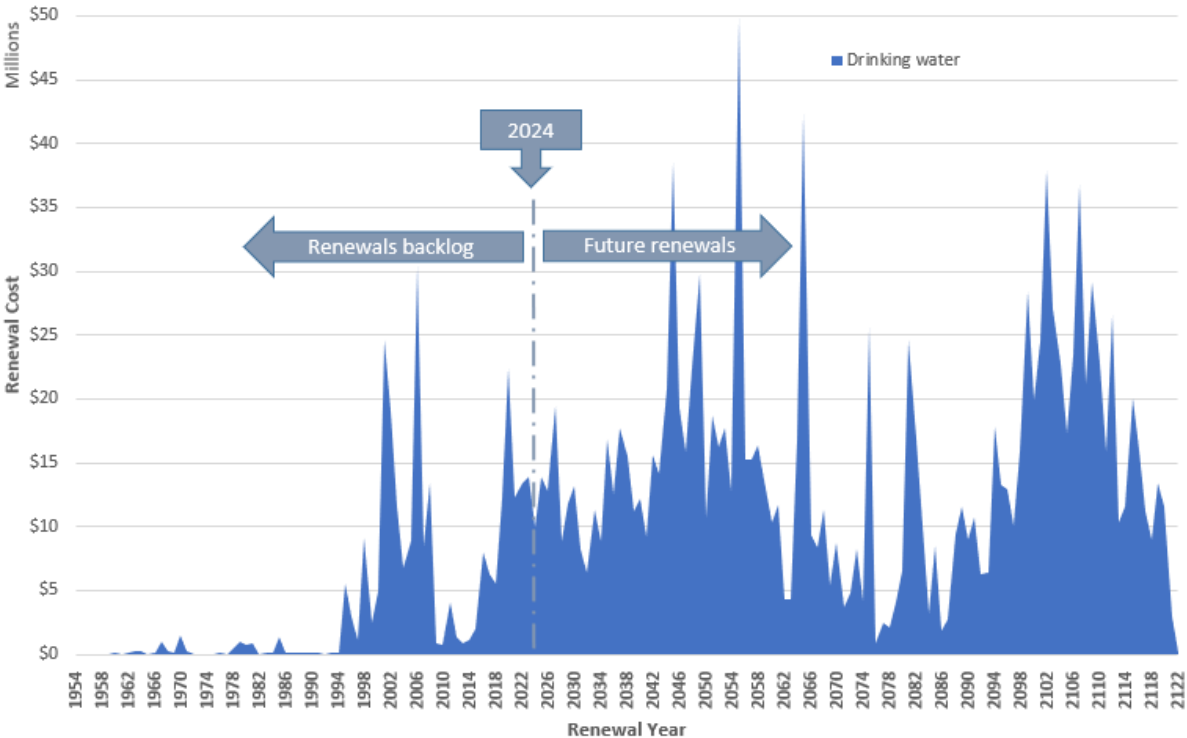


**water**  
NEW ZEALAND  
CONFERENCE & EXPO  
17-19 OCTOBER 2023  
Tākina, Te Whanganui-a-Tara Wellington

# Houston we have a problem...

Renewal backlog: \$30M

Projected renewal over next 3 years: \$150M



**But we don't have \$180M!**

# Risk

Likelihood (asset condition)

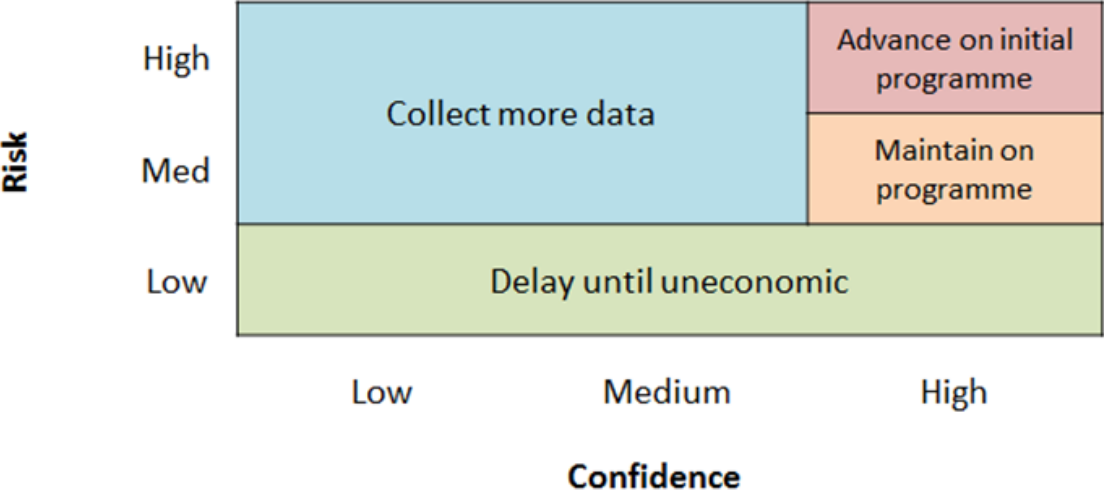
Consequence (asset criticality)



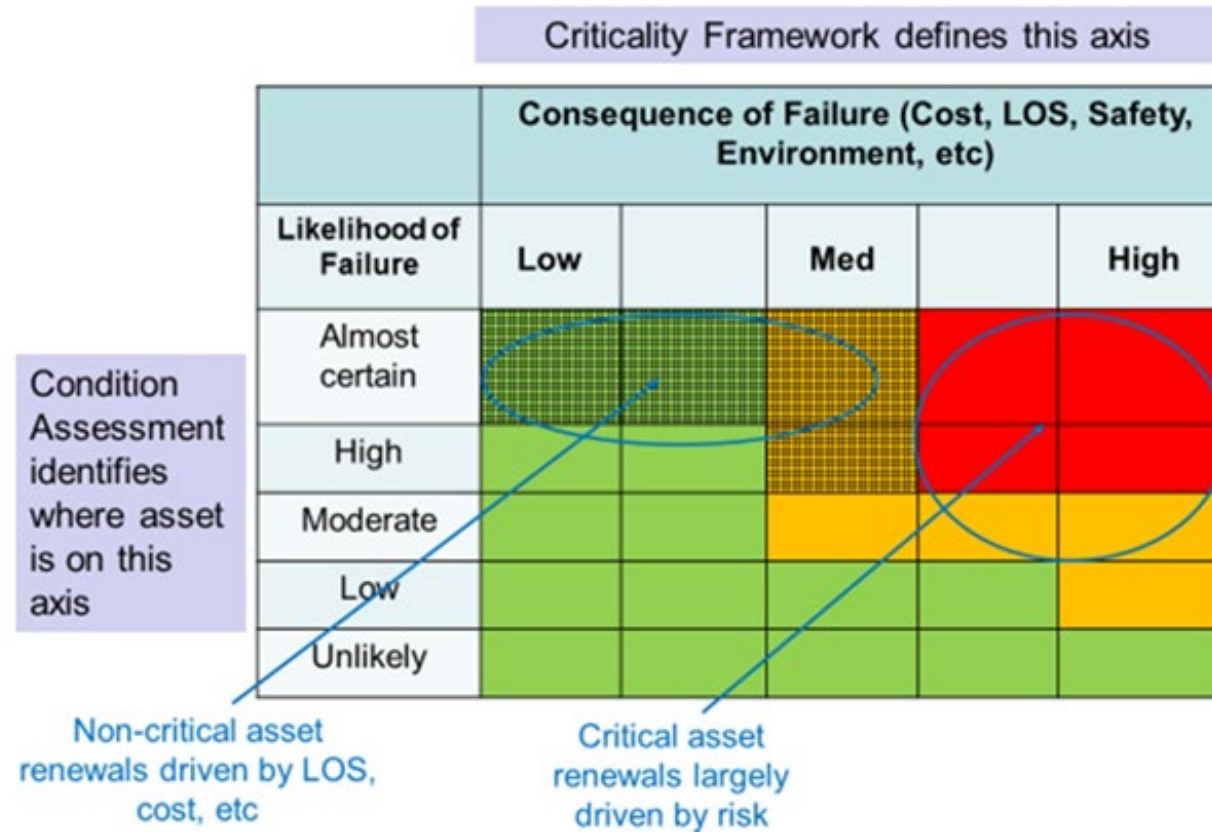
# Risk

Likelihood (asset condition)

Consequence (asset criticality)



# Criticality



# Short Term vs Long Term Planning

## Four Quadrant Approach

	Non-Critical Pipes	Critical Pipes
Short Term Planning (up to 10 years, includes LTP)	Routine renewal of customer service pipes and collection systems	'Just in time' renewal of critical pipes
Long Term Infrastructure Strategy (up to 30 years)	Predicting future renewals of collection systems	Predicting future renewal of critical pipes



# Predicted vs Observed

Desktop predictions of condition are good for long term renewal planning.

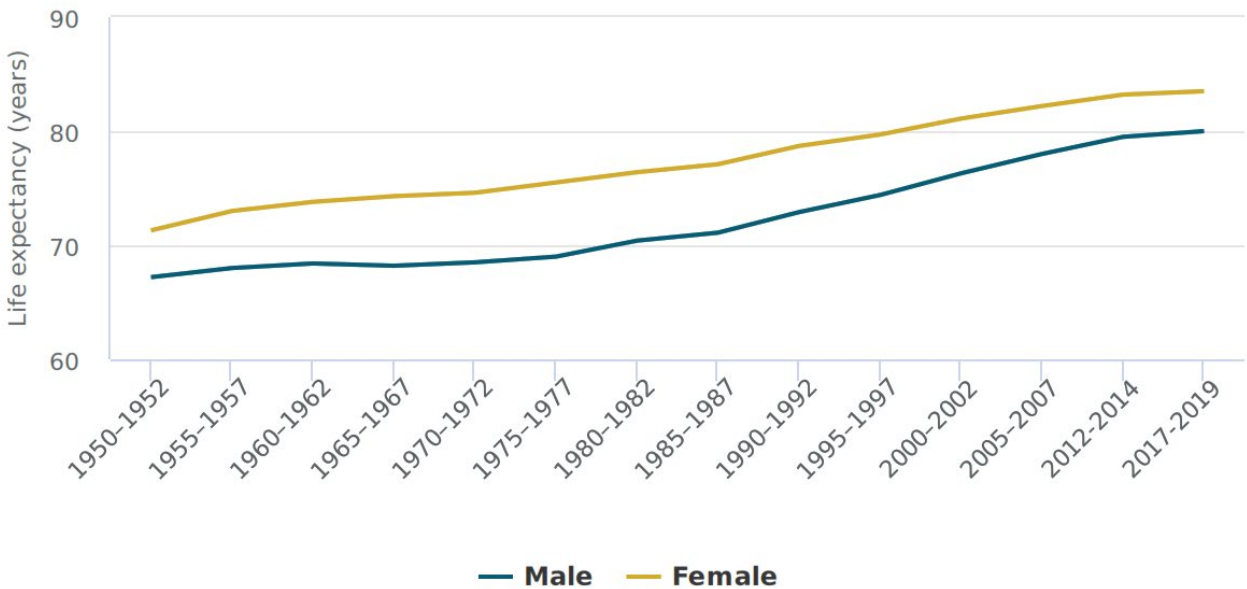
For short-term budget planning, improving confidence of condition data becomes particularly important.



# Likelihood of Failure

Actuary Table example

Life expectancy at birth, total population, by sex, 1950-1952 to 2017-2019

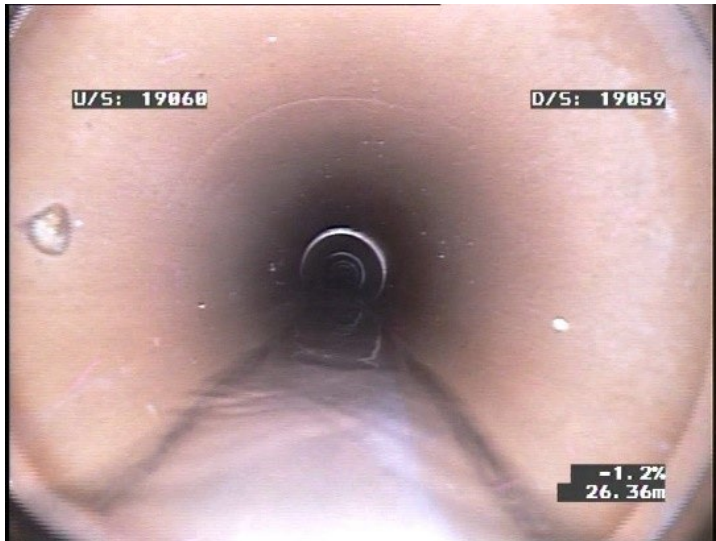


There is a seven-year gap between 2005-2007 and 2012-2014. Other periods have a five-year gap. Stats NZ





# Likelihood of Failure



Circumferential Crack

LoF = 1



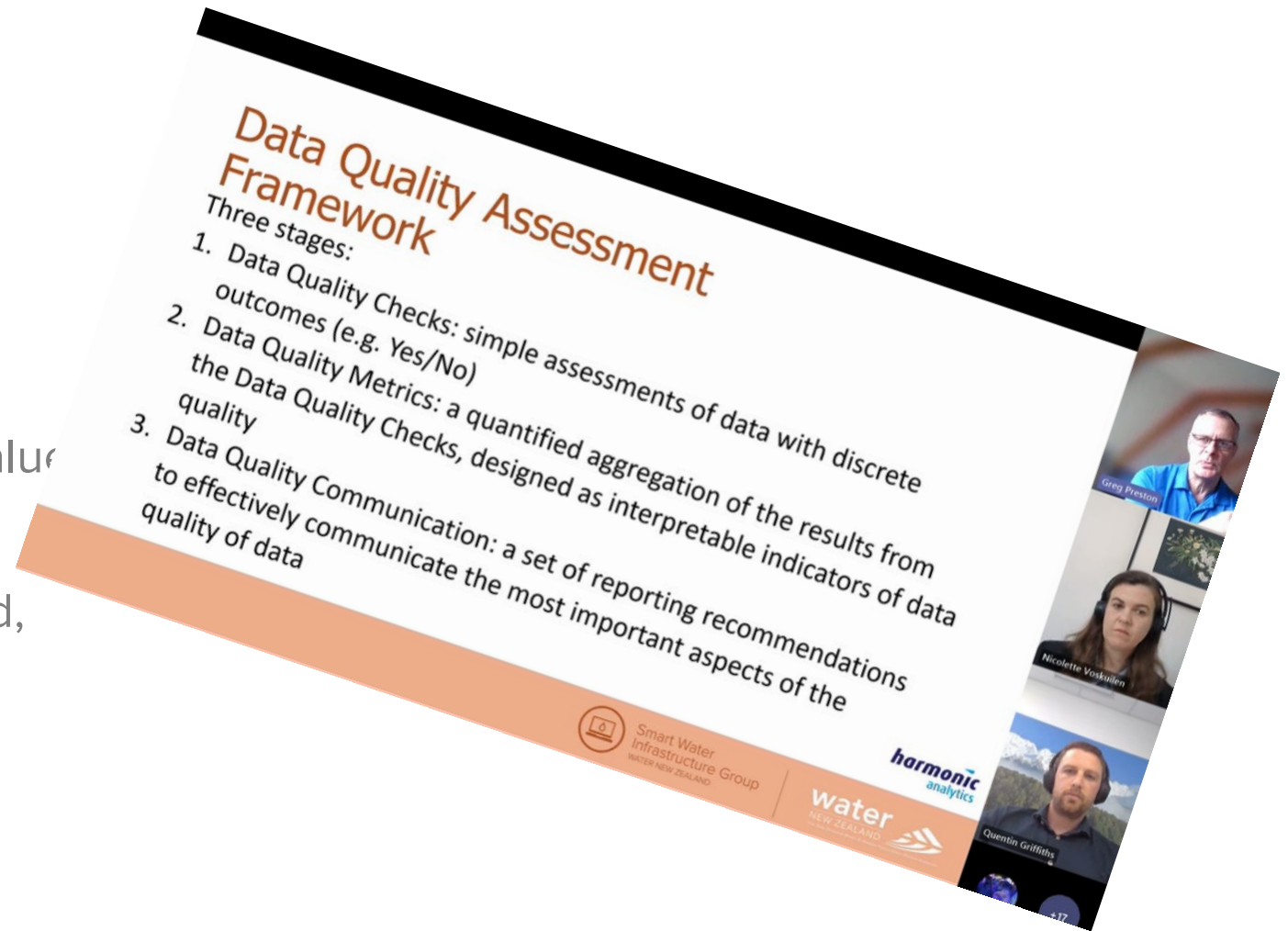
Multiple Cracks (Displaced)

LoF = 4

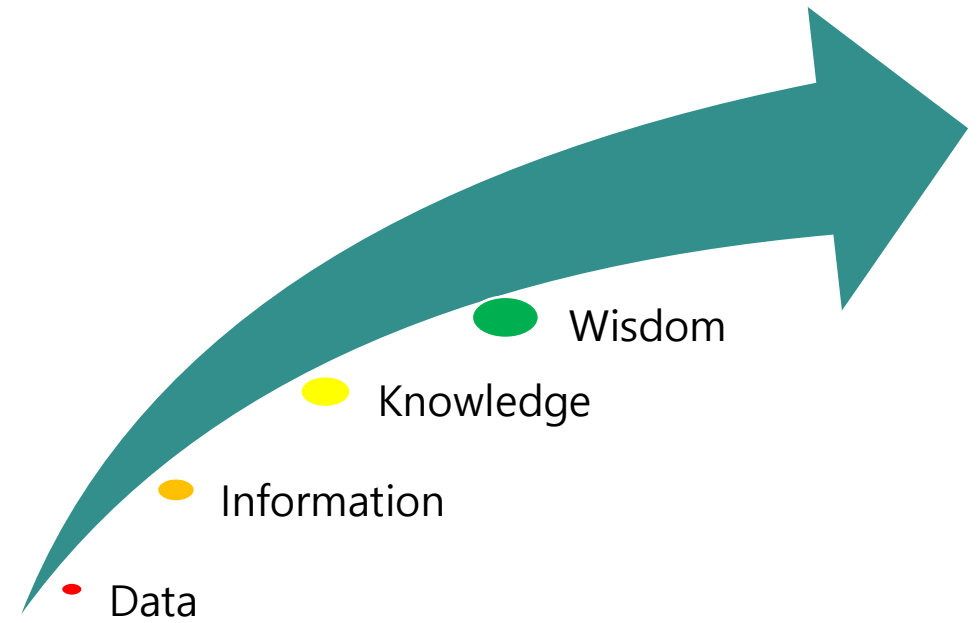
# Data Quality

## Data Quality Metrics

- Completeness: comprehensive, not missing values
- Accuracy: true reflection of actual value
- Validity of type & format
- Timeliness: available when expected, needed
- Alignment with data standards



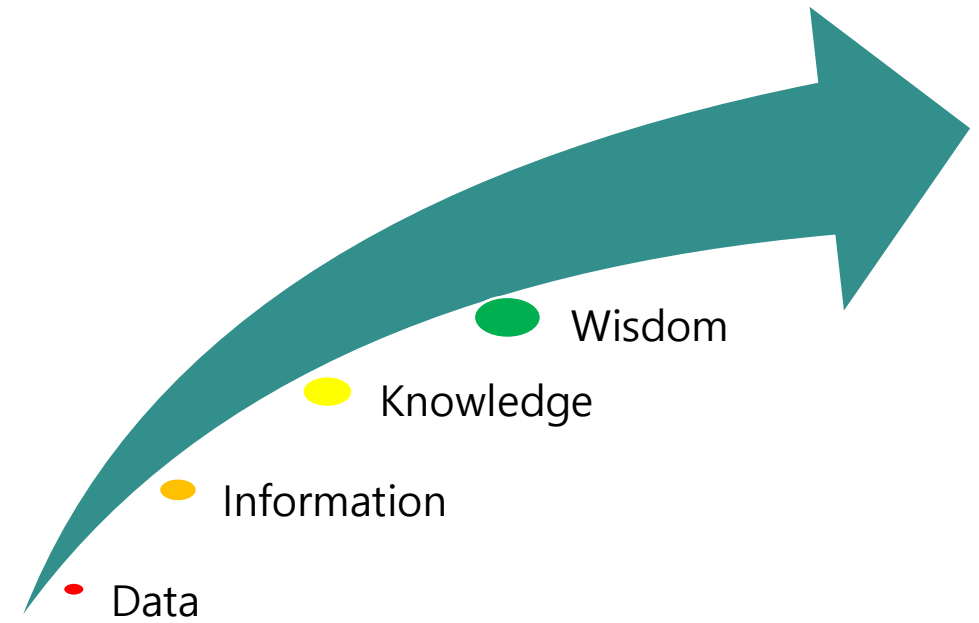
# Data vs Information: DIKW



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Data without context: not useful

- 4



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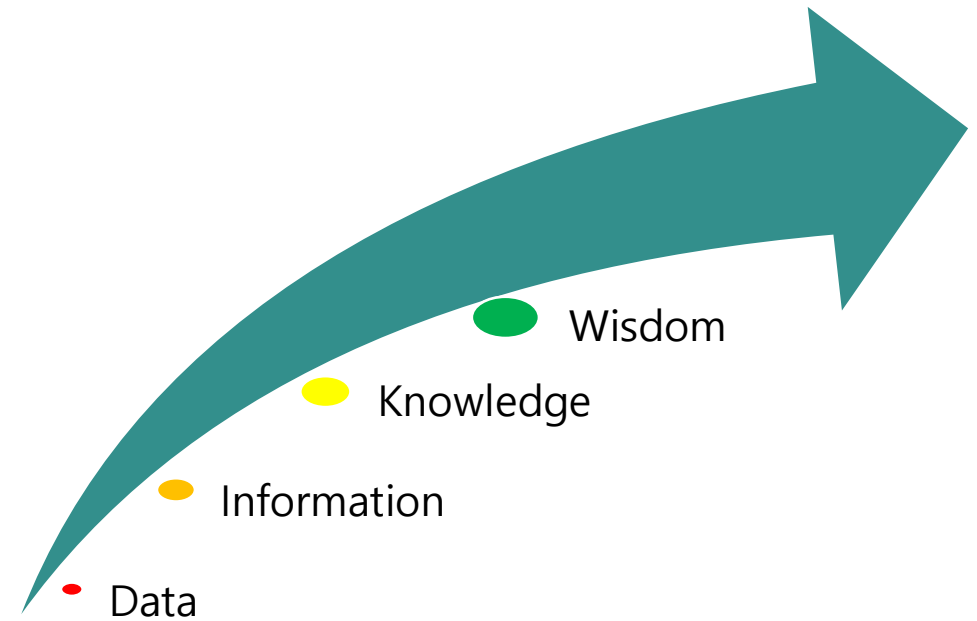
Data without context: not useful

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Add more data, information, context

- Structural Condition Grade = 4
- Gravity stormwater pipe
- Grade based on assessment of CCTV inspection data
- Inspected on June 1, 2023
- Material type – reinforced concrete
- Defects confined to downstream 2m of pipe

Higher the risk – higher the confidence!





# Data vs Information: DIKW

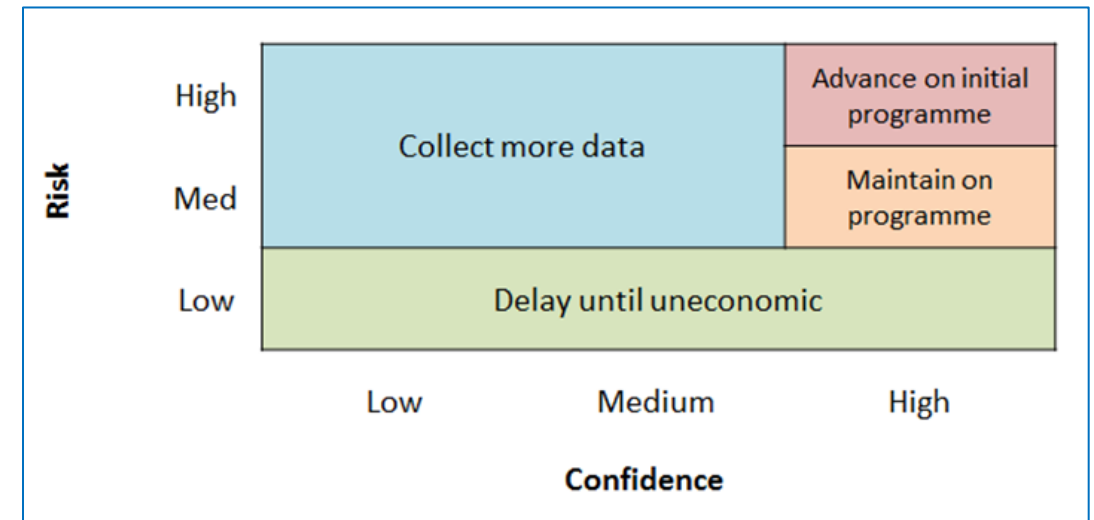
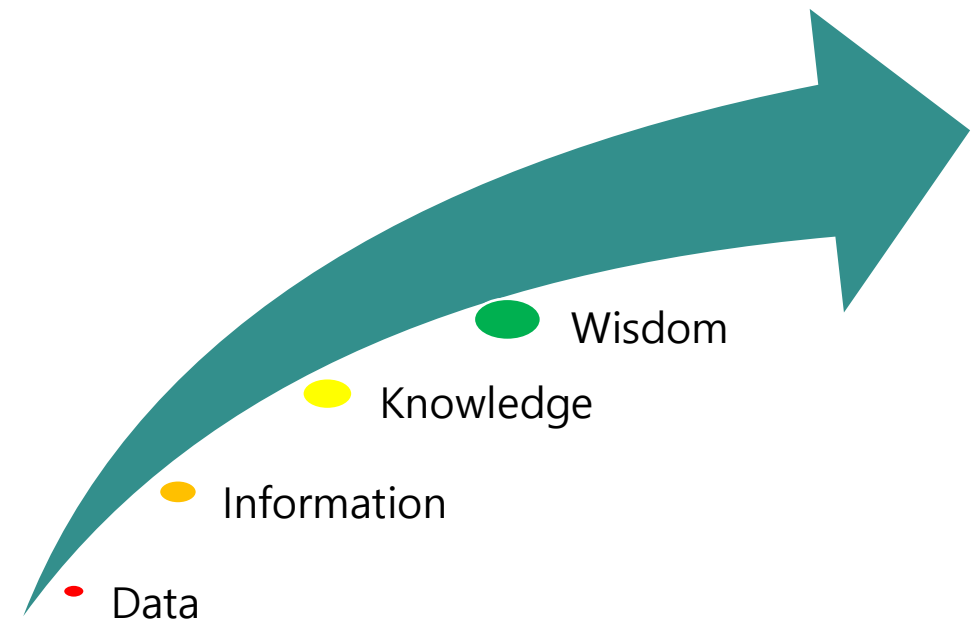
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# Confidence

What is confidence?



Image credits:

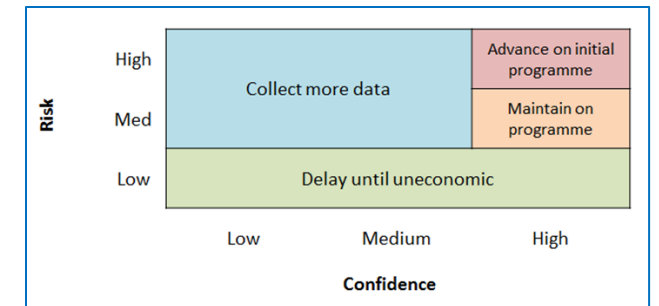
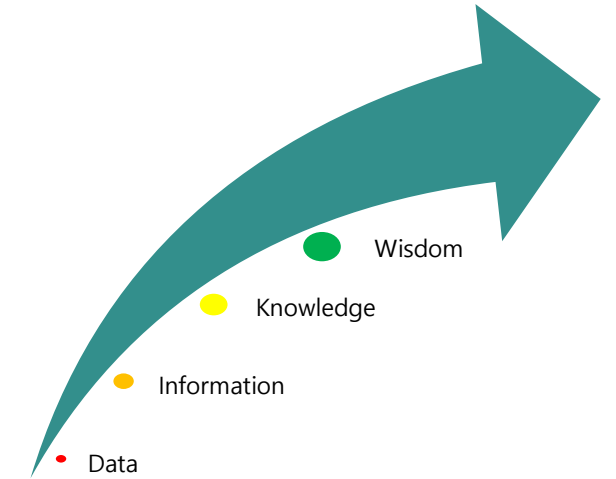
All Blacks: <https://giphy.com>

Risky Business: <https://giphy.com>

Van Halen: <https://media1.tenor.com>

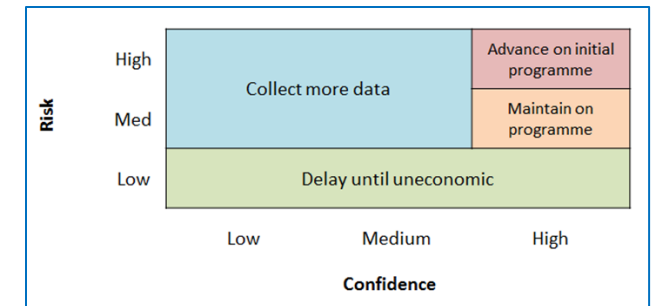
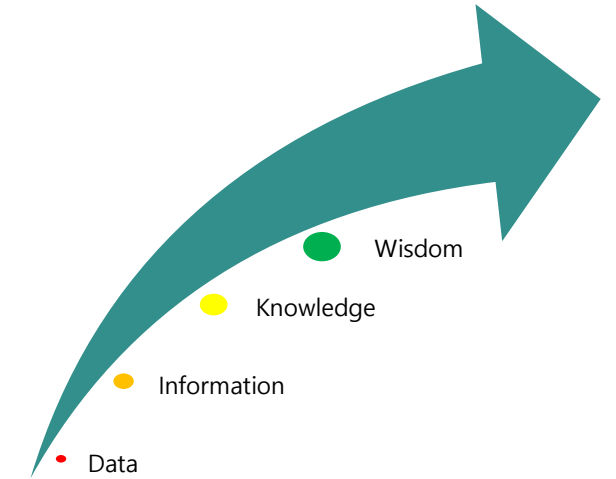
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Confidence Grade	Description
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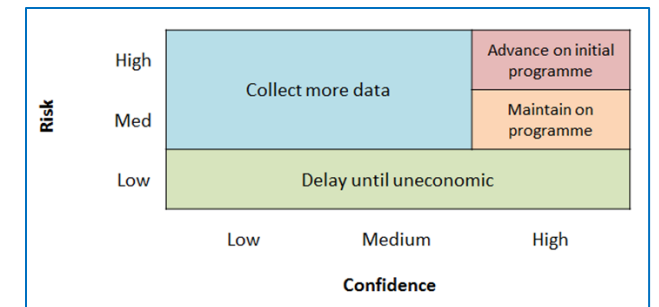
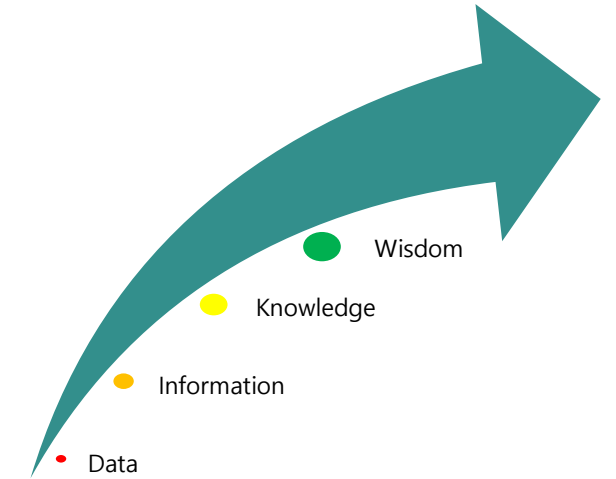
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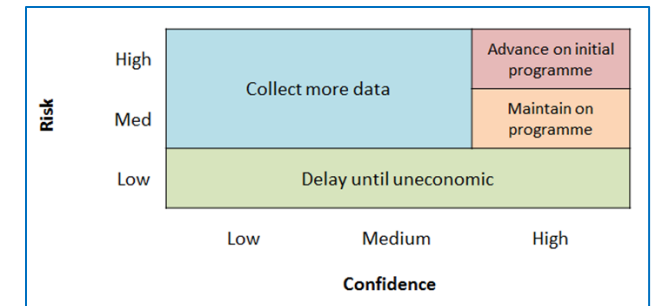
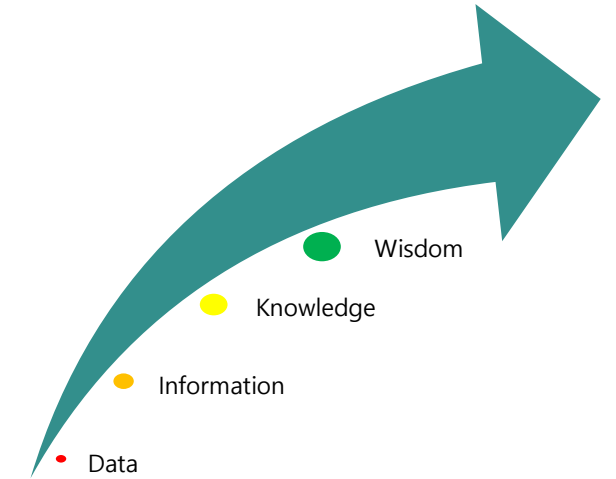
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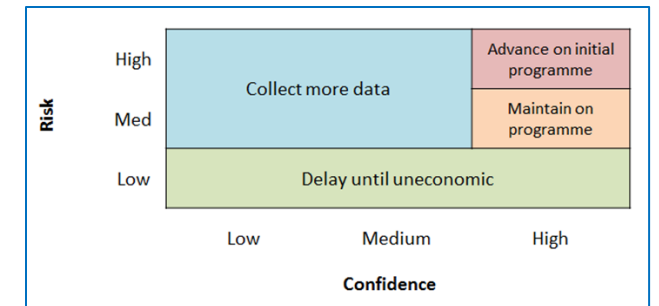
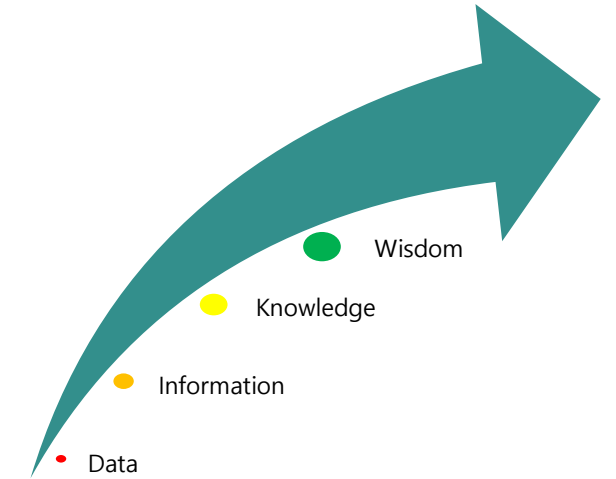
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<b>E</b> (Errors Identified)	Data errors identified including incorrect material type, install date, criticality, in-service status and other errors that would result in an incorrect short-term renewal prioritisation.

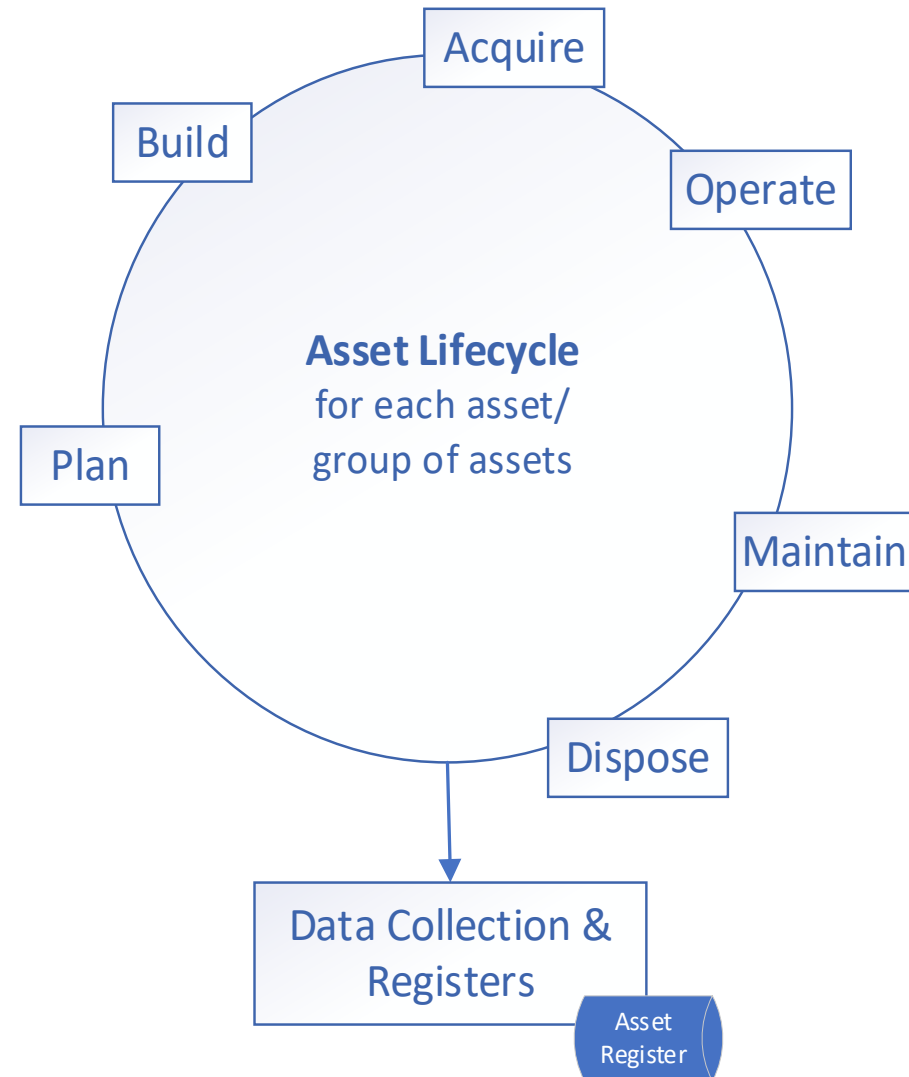


# But when?

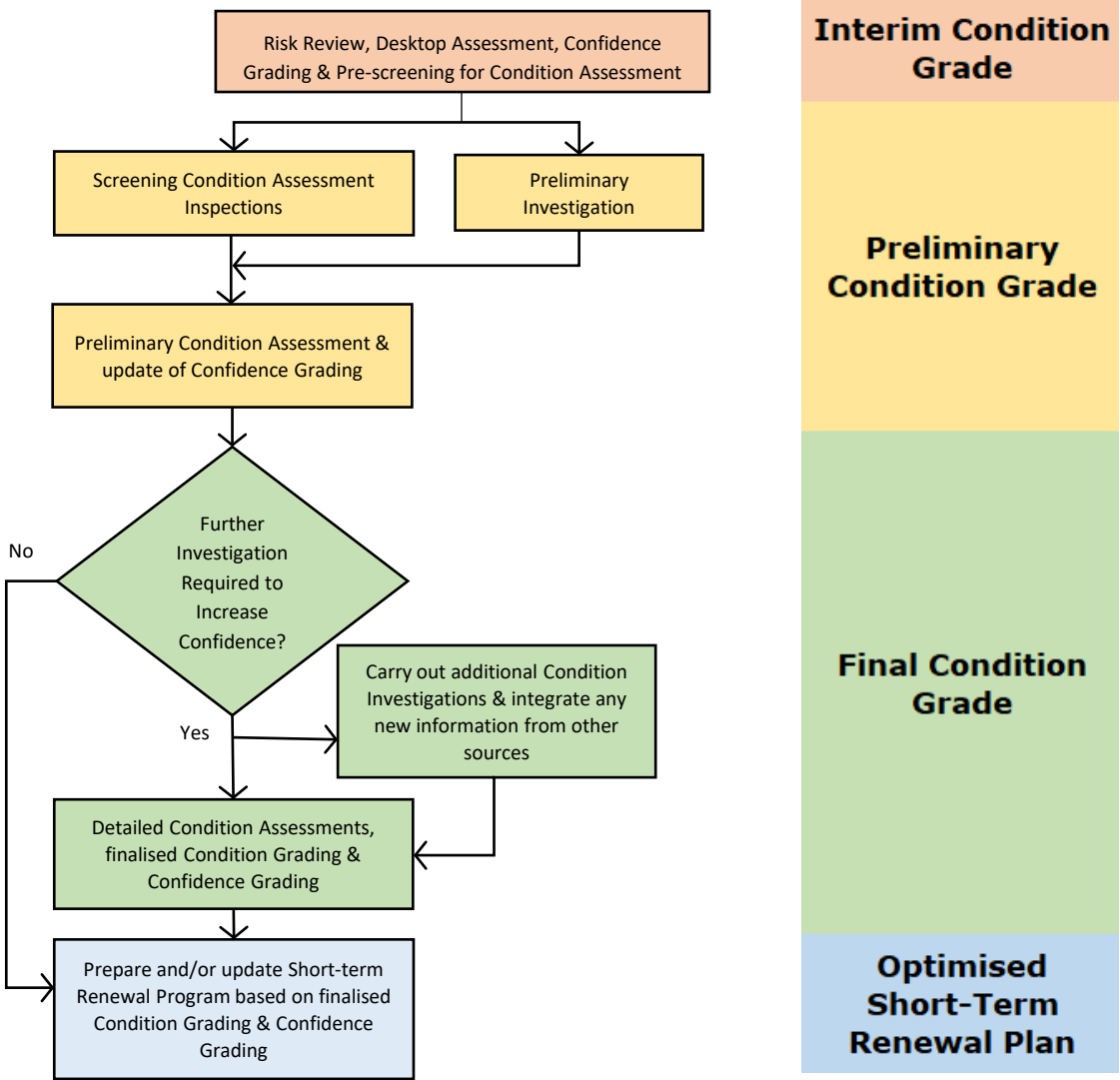
When is increased confidence needed?

Asset data collection occurs at all stages of an asset lifecycle

For short-term renewal planning of critical assets, increased confidence needed *before* renewal



# Recommended Strategy



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Step	Description	Condition Grade
Step 1	Define and confirm renewal strategy and approach	Interim Condition Grade
Step 2	Identify and collect available data including asset data (capturing inventory of network assets and relevant attribute information), criticality frameworks (for understanding criticality of network assets based on the consequence component of risk), network operational data, asset condition assessment data and adopted guidelines and standards for intervention and renewal	
Step 3	Perform gap and data confidence analysis	
Step 4	Apply criticality framework across all assets	
Step 5	Perform initial 'desktop' review to calculate 'Interim Condition Grade' and confidence score	



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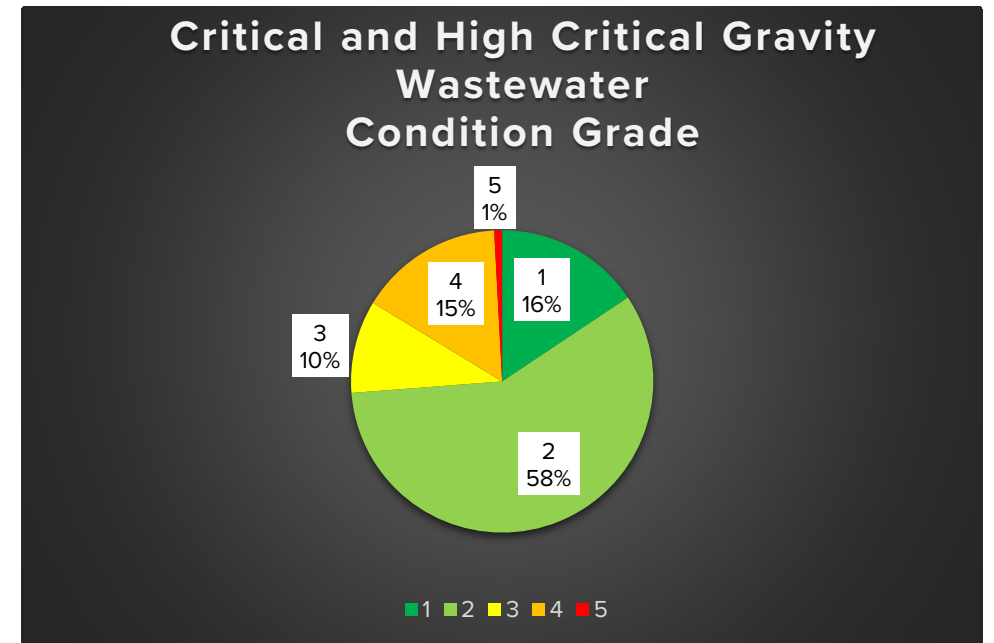
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Step 9	Calculate 'Final Condition Grade' and prepare information for renewal team	
Step 10	Prepare optimized short-term renewal plan based on optimized understanding of asset condition grade	Optimised Short-term Renewal Plan

# Case Study

- Applied criticality and data confidence grading across all assets for a large water utility
- Approximately 2,000km of critical or highly critical water, wastewater & stormwater assets
- 300km of all critical assets had a Condition Grade 4 or 5, Confidence Grade D
- Prioritised list generated for 5-year Condition Assessment Program
- Workshops with key stakeholders to validate prioritized list outcomes
- Final lists informing condition assessment, renewal programs
- Critical assets advancing to renewal inspected to increase Confidence Grade to A or B
- Outcomes inform continuous inspection programs & budget planning
- Process transparent, defensible, well documented



# Key Takeaways

- Long-term vs short-term renewal planning
- Risk: Criticality and Likelihood
- Criticality Framework
- Likelihood = asset condition
- Data-Information-Knowledge-Wisdom
- Tracking data confidence
- 10-step strategy: interim, preliminary, final condition grading & optimised short-term renewal program
- Transparent & defensible prioritized short-term renewal program





# Questions & Discussion

## Confronting the Tsunami – A New Approach to Renewal Planning

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